Near Detector Status & Schedule Update

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Fermilab PMG Meeting
4/26/10

NOvA Schedule Overview

Near Detector Surface Building

Near Detector Construction & Assembly Status

Near Detector Schedule

Color Code

- Information/plans

✓ Good status/completed

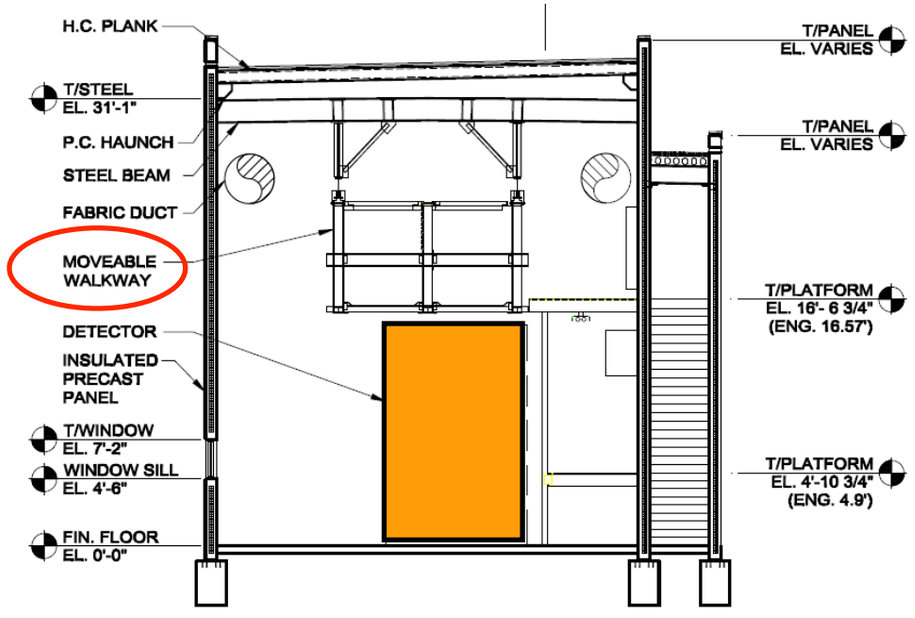
➡ Something to watch

Near Detector Building

New building near MINOS service building (M.S.B.)

- ✓ Construction started 12/07/09
- ✓ Walls windows doors up 02/08/10
- ✓ Floors poured 02/19/10
- ✓ Complete stairways 02/25/10
- ✓ Power tie-in to M.S.B. 04/13/10
- ✓ Stationary catwalks installed 04/23/10
- • Install secondary containment 05/12/10
- • Ready for 1st block 05/19/10
- • Movable platform installed 05/24/10

Experiment electrical work, secondary containment part of construction outfitting



Module Production

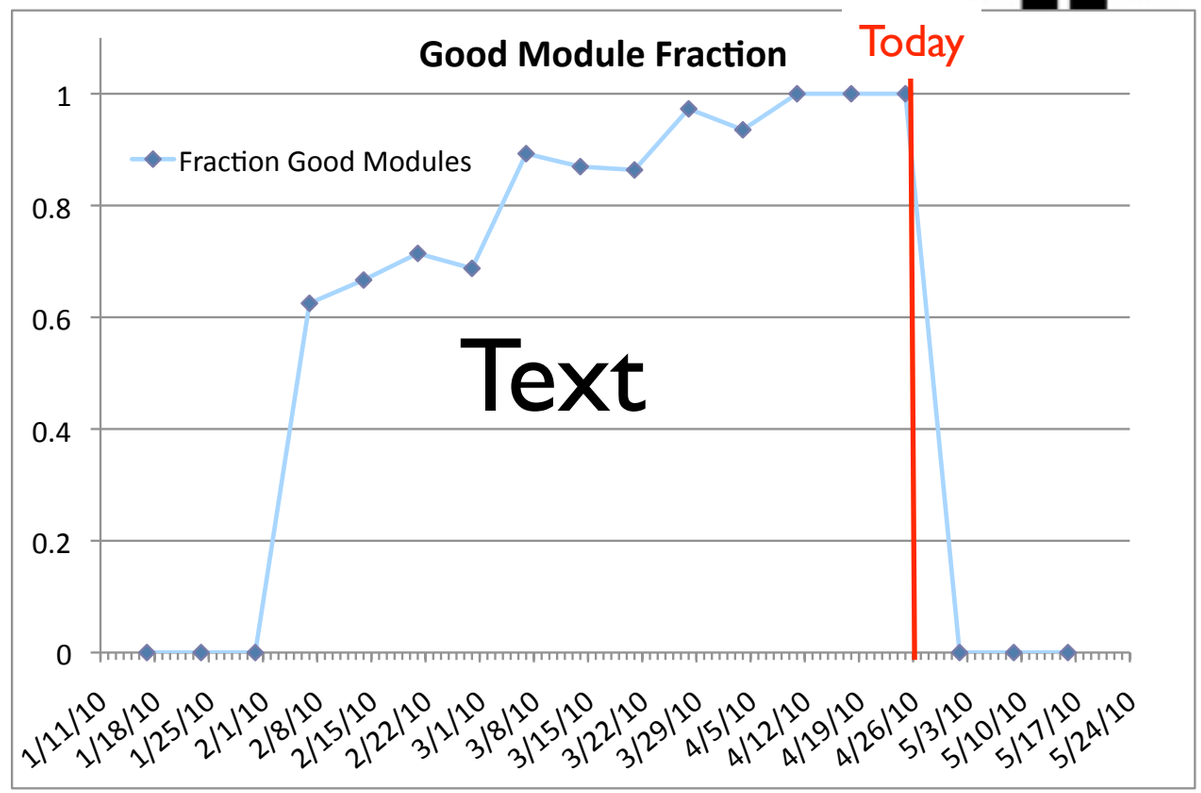
258 "good" modules produced

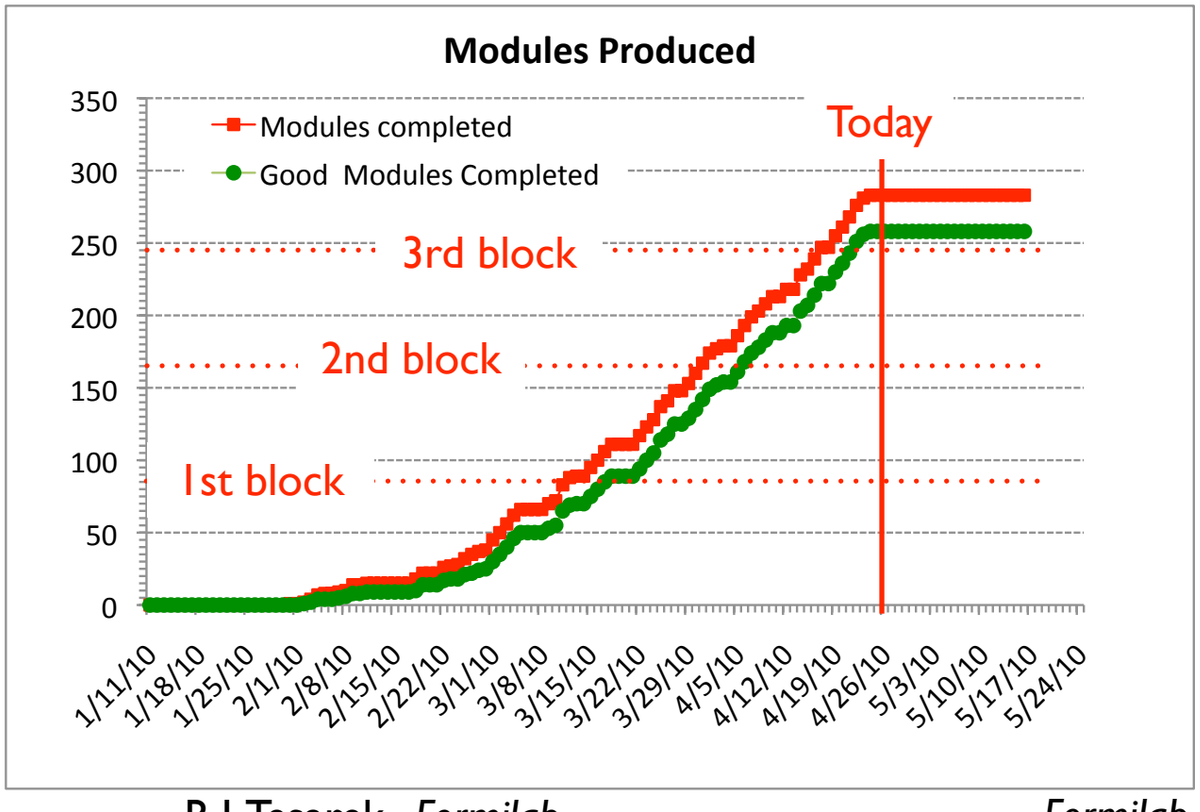
Assumptions

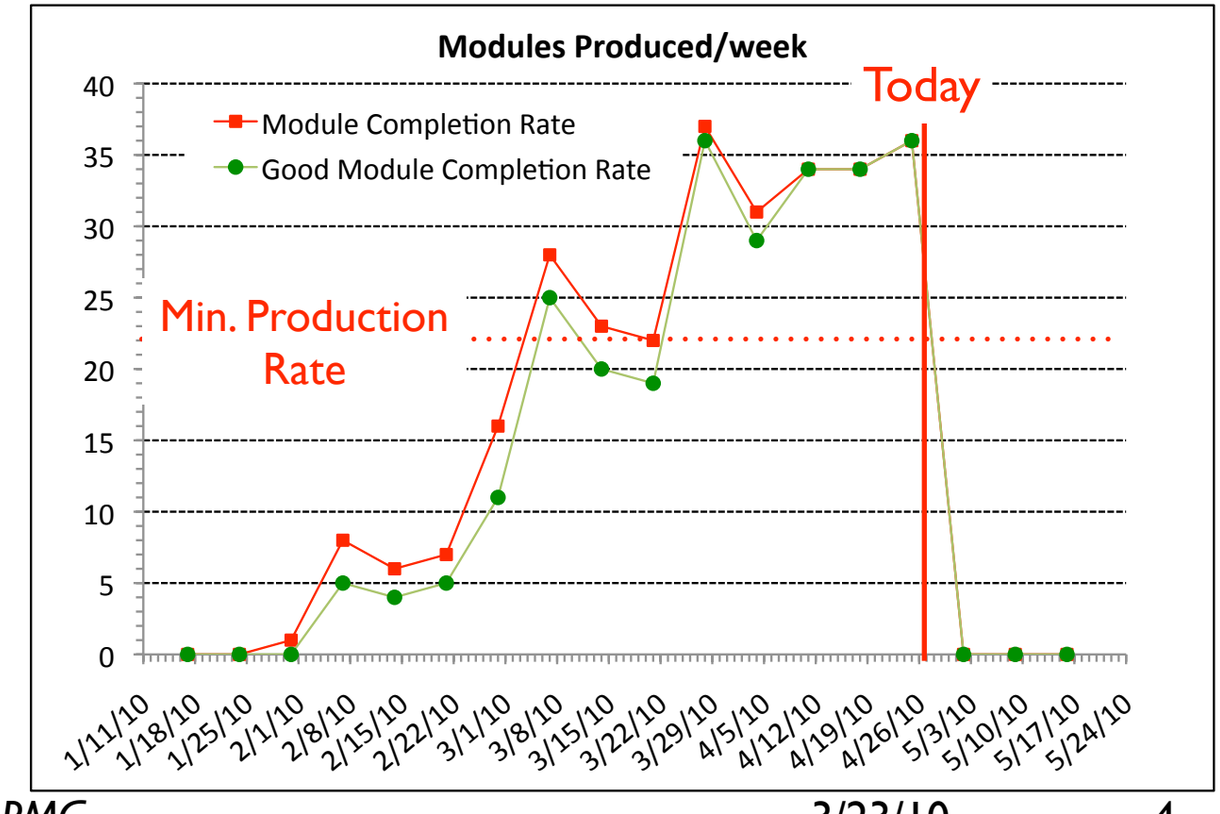
- Block = 83 modules (10% spare)
- "good" modules: no fibers damaged

Production Rate Analysis (RJT)

- Rate from Ken (30/wk)
- Rate, 8 wk avg (31/wk, "good")
- 4 blocks of modules (332) 5/19/10
- 5th block of modules 6/08/10

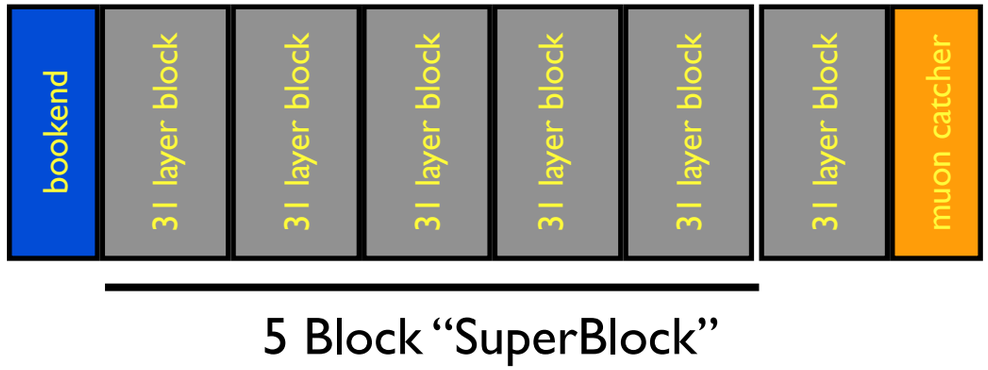


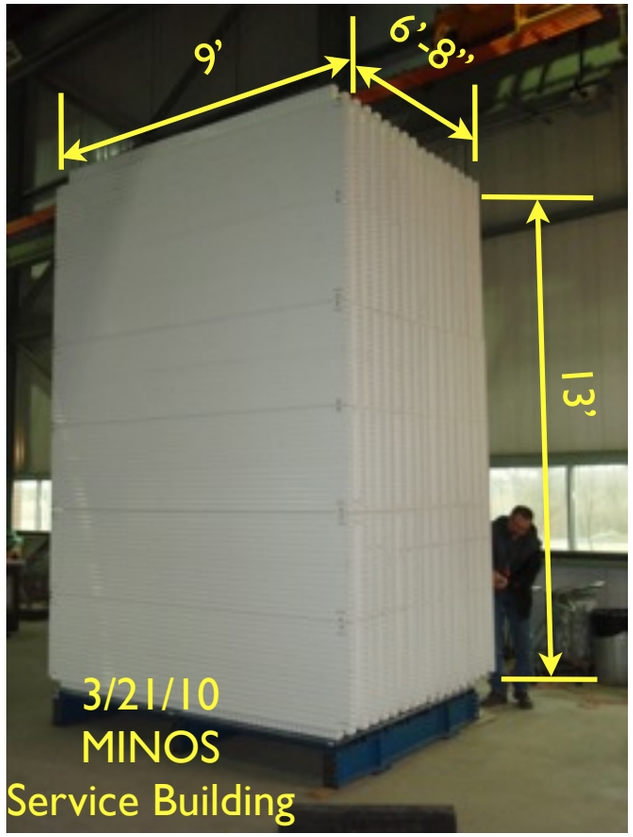




Near Detector Assembly

Near Detector Schematic





Prototype near detector block(31 planes)

- ✓ Glued prototype assembly completed 2/11/10
- ✓ Arrived in MINOS service building 3/16/10
- ✓ Assembly rate ~1hr/plane (2-3 modules/plane)

Near Detector block assembly

- ✓ 1st detector block completed (4/7/10)
- ✓ Leak tests and fiber test for all modules in block at ANL
- Need to paint production blocks black

Muon Catcher Design

- Engineering nearly complete (E.Villegas, FNAL)
- ✓ Steel plates ordered (4/1/10)

Scintillator

Waveshifting Powders

- ✓ All powders in hand for near detector scintillator
- ✓ All bis-MSB in hand (157 kg) for far detector
- ✓ 75% of total PPO in hand for far detector
- Remaining delivery of PPO in April

Blend scintillator for Near Detector

- Need 30,000 gallons for Near Detector
- ✓ Mineral oil supplier selected PR in procurement
- ✓ 60,000 gallons + options for full 3,000,000 gallons
- ✓ Bids in for toll blending scintillator (4/16/10)
- Toll blending bid evaluation underway
  - Select 2 vendors to blend 30,000 gallons each (competition)

➡Schedule depends on vendors (oil, pseudocumene, toll blender)

Blend scintillator at FNAL for vertical slice 5 (full size module)

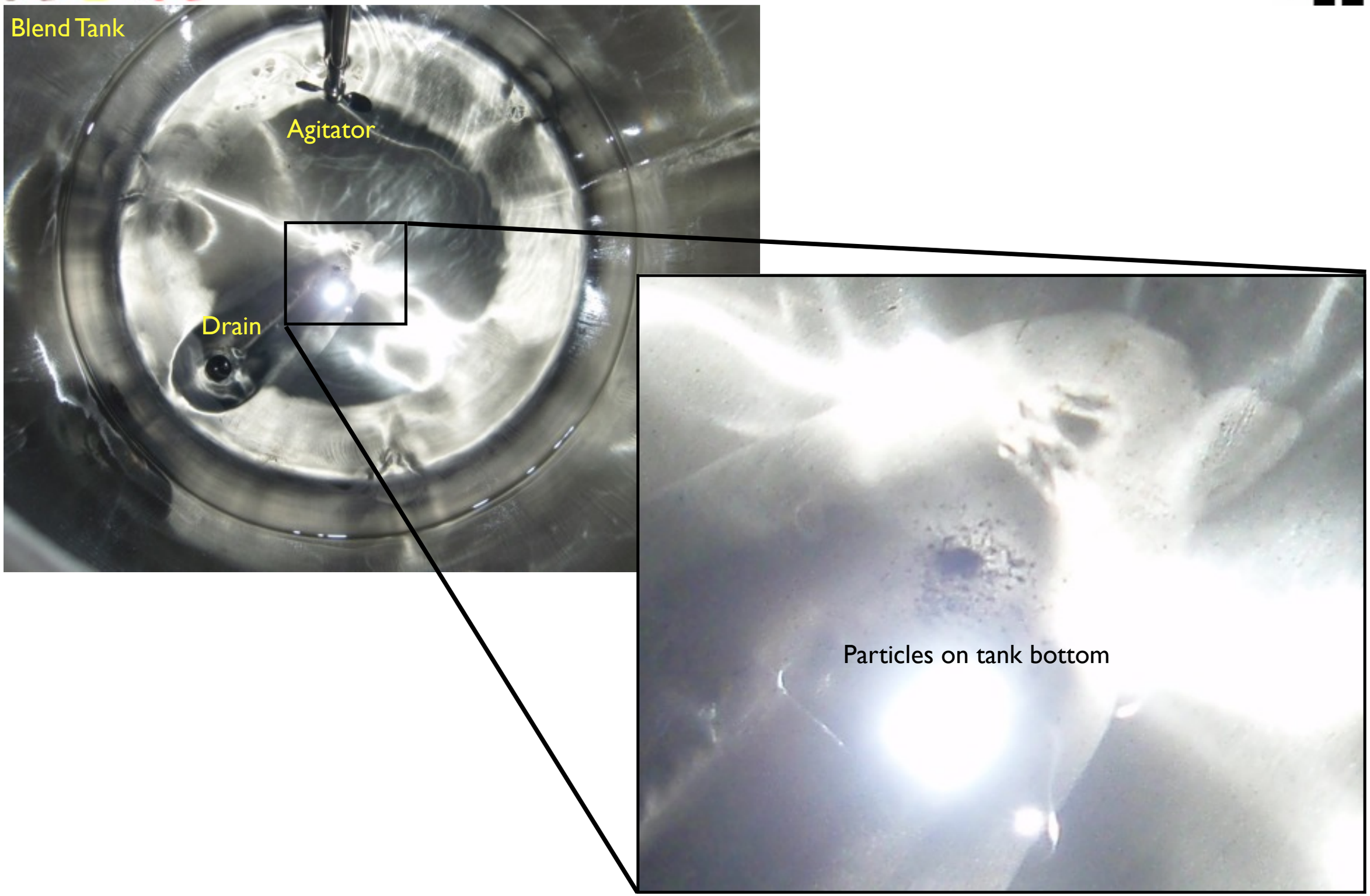
➡Scintillator blended, failed QA tests (attenuation length)

➡Particles found in fluor blend for 2nd batch

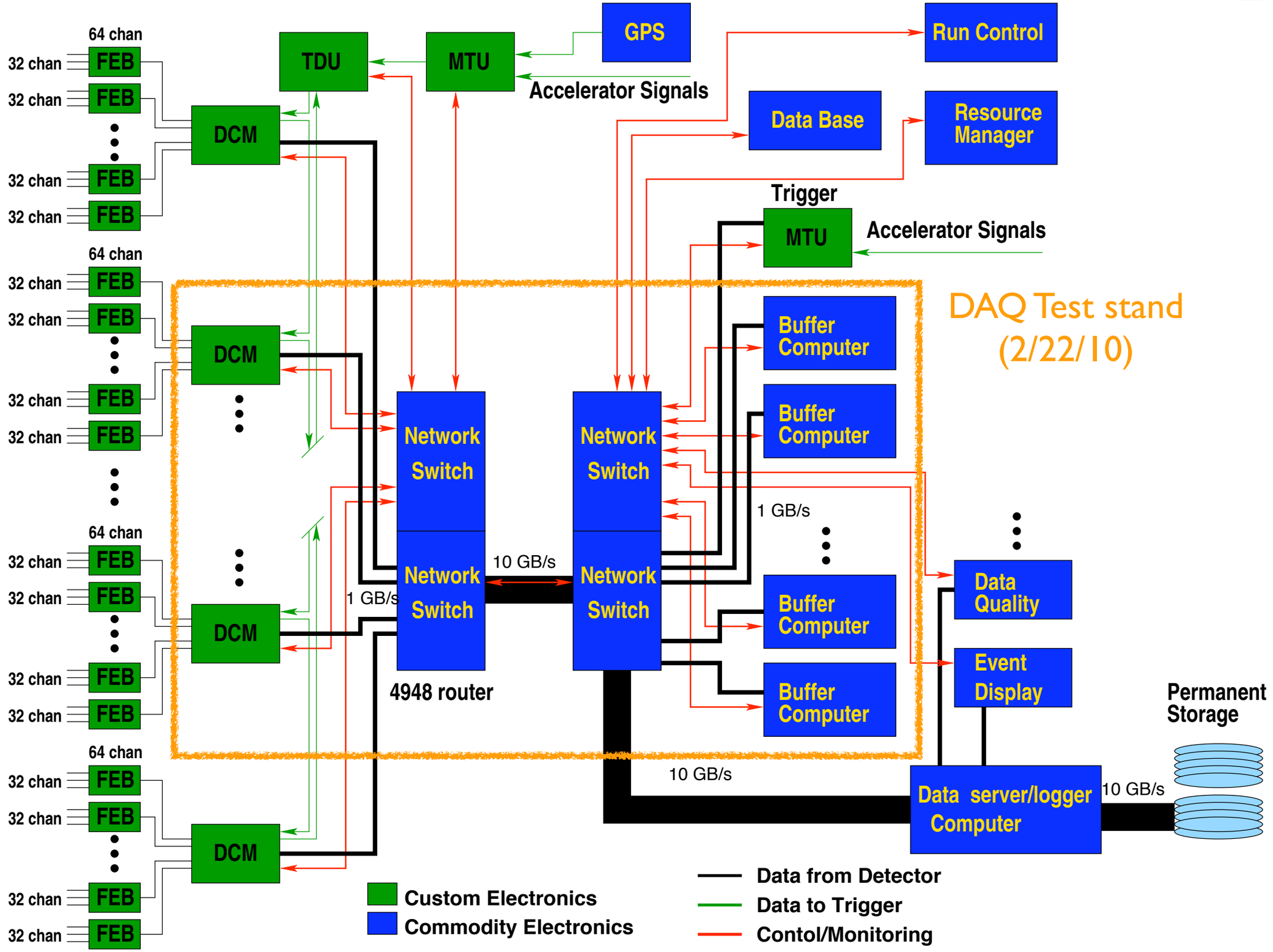
Initial design of near detector scintillator distribution system (J.Musser, W.Fox)

- Engineering design meeting this week

Particles in Fluor Blend



NOvA Electronics/DAQ Overview



DAQ Test stand (2/22/10)

Electronics

Avalanche Photo Diodes (APDs)

- ✓ First 20 APDs arrived (3/11/10)
- ✓ Dark currents very low (agree with Hamamatsu measurements)
- ➡ Production APD delivery 7/29/10
- ➡ 4 block milestone delayed!

Front End Board (FEB) v4

- ✓ PCB fabrication began(3/5/10)
- ✓ 5 FEBs in hand (4/1/10)
- ✓ FEB/DCM communication tests (April)
- • Production quantities begin arriving in May

Data Concentrator Modules(DCM)

- ✓ Prototype DCM (4) in DAQ test stand
- ✓ PO issued for 13 N.D. DCMs (3/12/10)
- • Expect DCMs for the near detector in late May

Time Distribution Units (TDU)

- ✓ 2 boards stuffed, checked and booting
- • firmware development/tests underway
- • expect TDUs for the near detector in late May

Networking/Computers

- ✓ Control room hardware at FNAL
- ✓ Network switches in hand
- • Purchase orders for DAQ computers out (buffer nodes, special purpose computers)

Power Distribution

- ✓ HV/LV power supplies ordered (3/5/10)
- ✓ Prototype Power Dist. Board (3/15/10)
- ✓ All parts ordered for production
- • PDB ready for installation end of May

DAQ Software

Significant replanning of tasks (P.Shanahan)

- ✓ Re-planning completed
- DAQ schedule completes "just in time" for IPND milestone
- De-scope DAQ activities to meet IPND milestone

Software

- ✓ DAQ specifications complete
- ✓ Software framework/external software packages complete
- ✓ Event structure/event building emulation complete
- Run Control State model largely defined
- Send simulated data from DCM to buffer nodes (early May)
- Simulated data complete chain test 1 DCM to 1 buffer node to data logger(mid May)
- Real data complete chain test multiple DCM to multiple buffer nodes to data logger (end May)

Detector controls

➡"No progress", needs advocate

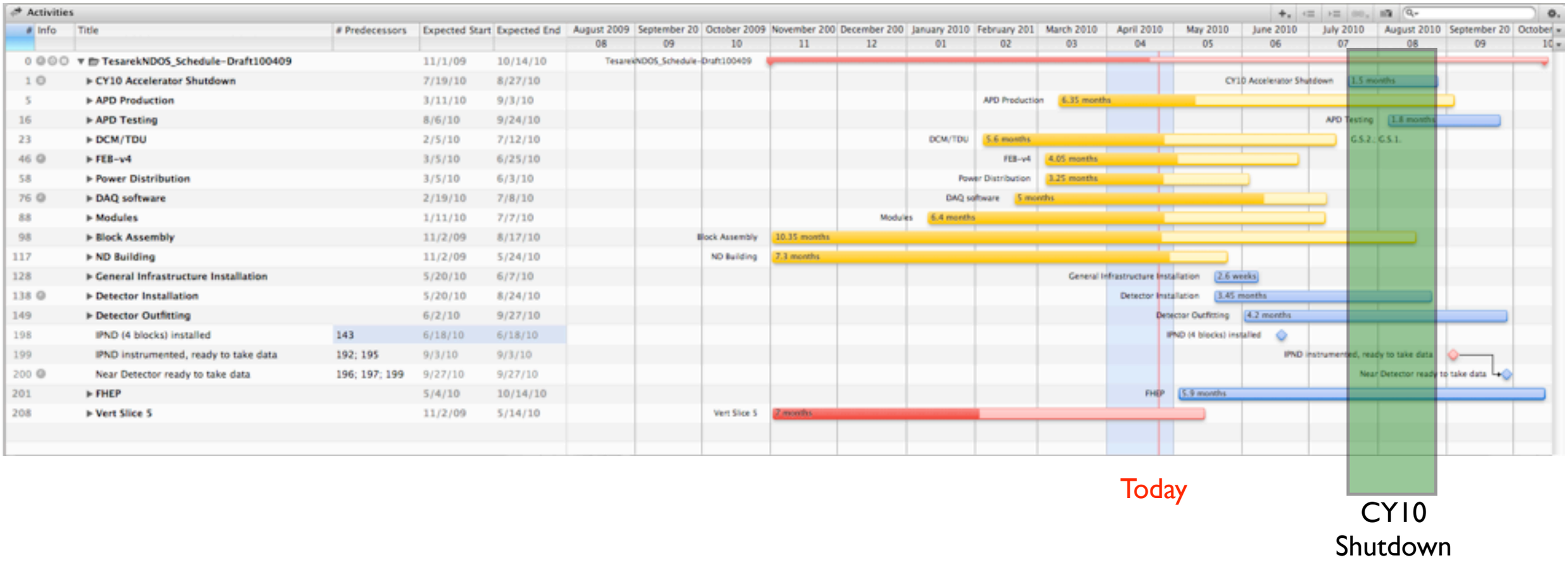
Near Detector Score Card

Item	Qty needed	Qty in-hand	Units	Fraction (%)
Detector Modules	497+spare	276		55.5
Detector Blocks	6.5	1		15.4
APDs	550	20		3.6
FEBs	550	5		0.9
DCMs	16	4		25.0
TDUs	4	2		50.0
HV supplies	3	0		0.0
LV supplies	7	1		14.3
Power Distribution Boxes	14	(1)[1]		0.0
Power Distribution Cards	240	(20)[1]		0.0
Scintillator	30,300	(4,500)[1]	gallons	0.0
Buffer Computers	16	0		0.0
Network Switches	2	2		100.0
Control Room Computers	5	5		100.0
Special Purpose Computers	4	0		0.0

Quantities for near detector + spares

[1] prototype components

Near Detector Schedule



Aggressive schedule to maximize data w/ near detector

- First block partially active last week in June
- IPND(4 blocks) ready to take data 9/3/10 (-39 days float for milestone)
- Working with Hamamatsu to advance delivery of APDs
- Full Detector ready to take data 3 weeks after IPND milestone

NOTE: Scintillator production is *NOT* in the schedule

Overview of Major Milestones

My projections based on input from managers

Near Detector Surface Building ready for near detector	5/19/10
332 modules complete (4 blocks + spares)	5/27/10
1st detector block installed	5/28/10
4th detector block complete	6/17/10
4th detector block installed	6/18/10
1st detector block filled with scintillator	6/28/10
1st detector block w/ instrumentation (20 modules)	6/30/10
All detector modules complete	7/07/10
4th detector block filled with scintillator	7/09/10
6th detector block installed	7/16/10
100 APDs arrive for testing	8/06/10
1st detector block fully instrumented	8/20/10
Muon catcher installed	8/24/10
Muon catcher filled with scintillator	8/27/10
4th detector block ready to take data (IPND)	9/03/10
Near detector ready to take data	9/27/10

Summary

Considerable progress for Near Detector since Jan. collaboration meeting

- ✓ New near detector building is up and outfitting is on schedule
- ✓ All near detector extrusions in hand
- ✓ All near detector WLS fiber in hand
- ✓ >254 modules produced of both types(H-thin wall, V-thick wall)
- ✓ 101 modules at ANL (~80 for block assembly)
- ✓ 1st near detector block complete
- ✓ FEB production prototypes under test
- ✓ DCM/Buffer computer test stand for software development

What to watch

- ➡Scintillator production (4500 gal in storage now).
- ➡APD delivery/testing schedule
- ➡Detector controls (slow monitoring)
- ➡Muon Catcher procurement/assembly

Other progress

- Most FHEP block pivoter parts in hand (waiting for component lifting fixtures)